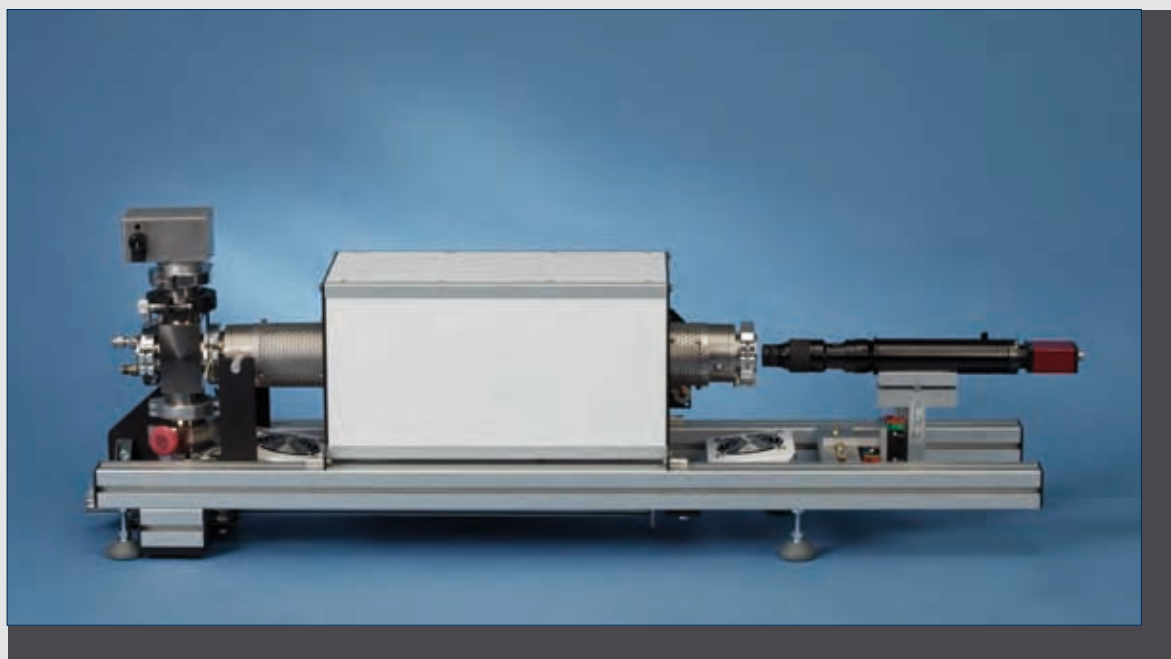


I N F O R M A T I O N

Drop shape analysis system DSAHT for extremely high temperatures



Wetting under extreme conditions – that is the special field of application for the DSAHT. The instrument measures contact angles and surface tensions, which makes it possible to record sample deformation at temperatures of up to 1750°C and under different atmospheres.

- **Contact angle measurement**
- **Measurement of surface tension**
- **Image recording of the sample shape with single frames and video sequences**
- **Temperature measurement in the immediate proximity of the sample**
- **High-contrast image from transmitted light despite heat induced sample emissions**
- **Quick and comfortable sample loading**
- **Built-in gas and vacuum connections**



Extremely versatile in use

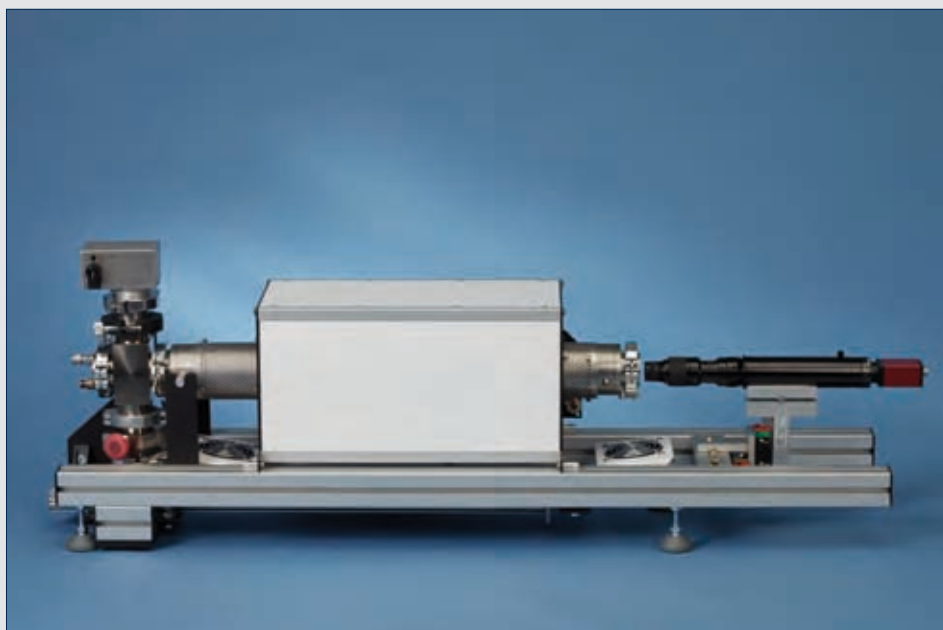
No matter whether glass, ceramics or steel, the DSAHT melts them all. Thanks to its flexibility in temperature range and gas atmospheres, the system can be used in many industry sectors in which extreme temperatures are encountered on a daily basis.

Smelting plants: During smelting, liquid metal or slag comes into contact with walls to which it should adhere to as little as possible. Contact angle measurements with the DSAHT show whether the degree of wetting is sufficiently low.

Glass production: Unwanted reactions between the glass and refractory bricks lead to material fatigue. The change in the contact angle as a function of time provides information about the extent to which such reactions are taking place.

Enamels: Optimal wetting of enamel coatings to the carrier material during processing is essential. A small contact angle is a prerequisite for a formulation with good wetting properties.

Ceramics: The behaviour of the green body – the gradual change in shape from a cone or cylinder to a flattened drop – can be observed and filmed with



KRÜSS Drop Shape Analyse System DSAHT

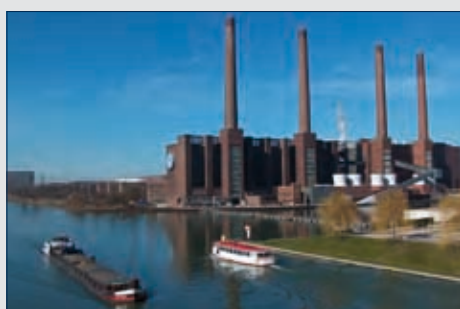
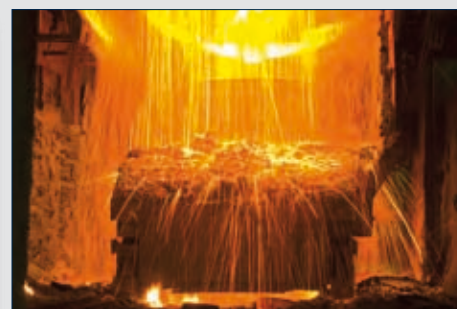
the DSAHT as a function of both time and temperature.

Metallurgy: The surface tension of the melt is an important parameter for the characterisation of metals and alloys. By using the DSAHT it can be calculated from the shape of a sessile drop.

Fossil fuels and biomass: Ash residues from combustion processes can coat reactor walls with a detrimental ash layer. Ash cone tests carried out in accordance with ASTM D1857, help to optimise reactor control.



- **Smelting plant**
- **Glass production**
- **Enamel coatings**
- **Ceramics**
- **Metallurgy**
- **Optimisation of combustion processes**



Extremely imaginative construction

A world class furnace design combined with years of experience in optical measurement techniques makes the DSAHT an instrument full of ideas for successful high-temperature optical studies.

Controlled temperature: Many possibilities are open to users - from setting a single target temperature up to programming time-controlled ramps and cycles. The long length of the furnace tube guarantees a homogeneous temperature distribution in the sample area and a favourable temperature gradient between the flanges resulting in an extended lifetime. The temperature sensor is embedded in the sample table so that the temperature is measured directly beneath the sample.

Done in a few steps: With the aid of flanges and a sliding device, the furnace is opened quickly, then loaded and closed again. The sample can also be

aligned even when the furnace is closed. As the working tube is mechanically separated from the heating elements it can be exchanged with little fuss.

Keeping a sharp eye: The camera is equipped with a zoom focusing lens that permits continuous observation of the sample: on the screen, as single frames or as a video sequence.

Crystal clear images: The DSAHT creates a sharp, high-contrast image of the glowing sample. This technical achievement is possible thanks to a filtering technique that allows light from the light source to pass through whilst preventing the transmission of sample-emitted light.

A versatile system: With different versions from 1200°C, 1500°C up to 1750°C, KRÜSS provides the optimum instrument for the required target tem-



View of a metal drop

perature. In all temperature ranges, the working tube can be operated under different atmospheres: oxidizing, inert, reducing. The appropriate gas connections are built in as standard, as is a pump connection for working under vacuum (up to 1000°C).

Extremely intelligent measurement

Temperature measurement, image recording and drop shape analysis: All the threads are gathered together in the DSA software. An optional software module reads out the temperature sensor and starts the measurement. In this way, the contact angle and surface tension, measured simultaneously or singularly, can be plotted as a function of temperature or time.

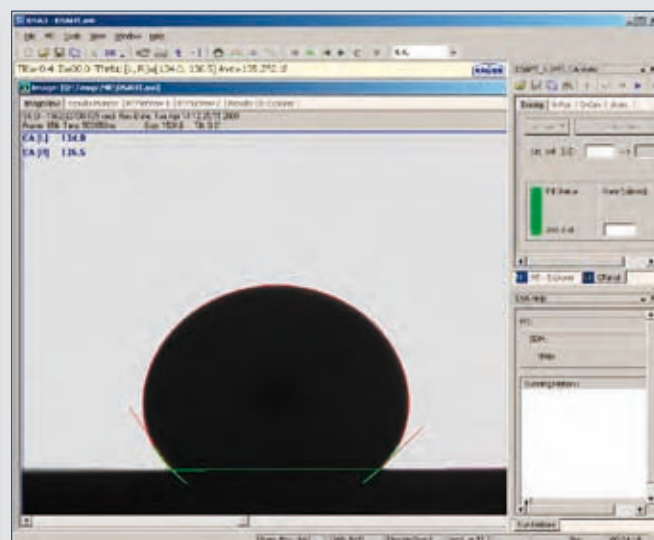
Several proven and robust methods are available for measuring the contact angle of favourably or poorly wetting drops. The surface tension is calculated from the curvature of the drop shape.

As an alternative to online evaluation, a video recording of the sample can also be programmed. Recording time and image recording rate can be set

at individual steps in the measurement thus allowing both long-term behaviour and rapid changes in a particular temperature range to be saved into a single video file for post-processing.



Image recording of the smelting process with accompanying contact angle measurement



DSAHT technical data



	DSAHT12	DSAHT15	DSAHT17-1	DSAHT17-2
Max. temperature	1200 °C (1473 K)	1500 °C (1773 K)	1750 °C (2023 K)	1750 °C (2023 K)
Heater material	FeCrAl	MoSi ₂	Mo	MoSi ₂
Thermocouple	Typ S	Typ S	Typ B	Type B
Sample tube material	Al ₂ O ₃ +SiO ₂ (C610 / Pythagoras)	Al ₂ O ₃	Al ₂ O ₃	Al ₂ O ₃
Sample chamber atmosphere	Inert gas, air, reducing, vacuum	Inert gas, air, reducing, vacuum	Inert gas, reducing, vacuum	Air, reducing, vacuum
Temperature limit under vacuum	1000 °C	1000 °C	1000 °C	1000 °C
Sample tube diameter	40 mm	40 mm	40 mm	40 mm
Sample placement area	4 cm ²	4 cm ²	4 cm ²	4 cm ²
Measuring range (contact angle)*	1° - 180°	1° - 180°	1° - 180°	1° - 180°
Measuring resolution (contact angle)	0.1°	0.1°	0.1°	0.1°
Optics	6.5× zoom with fine-adjustment focus	6.5× zoom with fine-adjustment focus	6.5× zoom with fine-adjustment focus	6.5× zoom with fine-adjustment focus
Power supply (Optics)	110/240 V, 50/60 Hz	110/240 V, 50/60 Hz	110/240 V, 50/60 Hz	110/240 V, 50/60 Hz
Power supply (heating elements)	230 V, 10 A	230 V, 16 A	230 V, 32 A	230 V, 32 A
Interfaces	RS232, IEEE1394b	RS232, IEEE1394b	RS232, IEEE1394b	RS232, IEEE1394b

We reserve the right to make technical alterations.

* Refers to image analysis

Accessories

Rotary Vane Pump with connection tube for gas exchange

Contact Angle Standard Set for testing of contact angle measurement



<http://www.kruss.de>